

Waquoit Bay Subwatershed Cape Cod, Massachusetts

The Waquoit Bay Subwatershed is located in Mashpee, Falmouth, and Sandwich. It has an area of 12,656 acres.

The subwatershed hosts the Waquoit Bay National Estuarine Research Reserve (WBNERR), which is part of National Estuarine Research Reserve System. It is cofunded and managed by the National Oceanic and Atmospheric Administration and Massachusetts Department of Conservation and Recreation. The primary mission of WBNERR is to enhance the practice of coastal zone management by providing a link between the research community and the products of their endeavors to local and regional planning and regulatory authorities and to the public. The 2,600 acre reserve includes open water, barrier beaches and sand dunes, fresh and saltwater marshes, and uplands. Public facilities within the reserve include South Cape Beach State Park, Washburn Island, and the Reserve Headquarters. WBNERR also manages land along the Quashnet River, a revitalized trout stream.

Waquoit Bay has been subject to numerous studies of its water quality, natural processes, and how surrounding land uses and development impact the bay ecosystem. In particular, WBNERR has sponsored and conducted research on the impacts of nitrogen from watershed land use on marine resources. The studies have confirmed that the largest sources of nitrogen in the Bay are wastewater treatment, residential and commercial fertilizers, and atmospheric deposition. Documented changes in the bay include increased algae, loss of eel grass, depleted oxygen, reduced water clarity, and increased incidences of fish and shellfish kills. The bay was once a very productive shellfishing area, but eutrophication of the bay's waters has led to the loss of almost all the eelgrass beds and a subsequent decline in shellfish productivity. It was established that the subbasins around Waquoit Bay with greater housing density and higher nitrogen loading rates showed more rapid rates of eelgrass decline.

A 2000 survey conducted in the Seacoast Shores area, one of the most densely populated areas in the Town of Falmouth, found that 90% of the residents surveyed would support efforts to reduce nitrogen loading to Waquoit Bay. There are approximately 900 residences in the neighborhood.

Waquoit Bay is part of Massachusetts Ocean Sanctuary System. The bay was open to shellfishing in the summer of 2000. Because of poor water quality in many Falmouth water bodies, this was one of the only areas open to shellfishing.

Restoration efforts on the Quashnet River have resulted in a self-sustaining brook trout population. A small dam on the river hinders fish passage at certain flows. The dam also impounds water that negatively impacts water quality for resident fish populations. The Massachusetts Department of Fish and Game began evaluating the site in March 2002 for possible river restoration and dam removal.

A study conducted through the Boston University Marine Program in 2001 found that wastewater nitrogen from groundwater accounts for between 40 and 65 percent of nitrogen entering the Quashnet and Child's Rivers and 81 to 82 percent of the nitrogen entering Ashumet Pond. DMF completed a Sanitary Survey along the Eel Pond shoreline in January 1994 and along the shorelines of the Great and Little Rivers Complex in May 1999. The Eel Pond survey identified 24 locations where there is evidence of stormwater discharge or road runoff into the pond and the Great and Little River Complex survey identified 46 locations. The waterbodies show signs of being impacted by runoff.

Under the Massachusetts Wetlands Restoration Program, partial funding was secured to study the impacts of two roads on South Cape Beach on wetland health. Studies to date have confirmed that the roads interfere with flow, resulting in wetlands degradation.

The Waquoit Bay Area of Critical Environmental Concern is located in this subwatershed. It includes Washburn Island, South Cape Beach, and surrounding areas up to the 11-foot contour above mean sea level. This complex is the most extensive, largely unaltered estuarine system on the south shore of Cape Cod.

This subwatershed hosts the majority of the Mashpee National Wildlife Refuge (MNWR). The MNWR was created in 1995 as a federal, state, and local partnership. A Management Committee comprised of the various partners is in the process of developing a management coordination plan for the area. There is a Memorandum of Understanding between parties who own land within its boundary, along with the Mashpee Wampanoag Indian Tribal Council, to manage their lands and in a coordinated manner. The refuge covers an area of 5,800 acres. Protected lands in the MNWR have been acquired through purchases, donations, Self-Help and Land Bank monies, and being taken for taxes. A great variety of fish and wildlife habitats comprise the refuge, including salt water bays, tidal marshes, Atlantic White Cedar swamps, vernal pools, wooded lowlands and uplands, mixed canopy forests, freshwater marshes and streams, kettle hole ponds, and pitch pine barrens. There are 1,649 acres within the refuge that are still in private ownership. A federal staff person at the Monomoy National Wildlife Refuge in Chatham devotes part of her time to the management of the MNWR.

The northern portion of the Waquoit Bay Subwatershed falls within the Massachusetts Military Reservation. Past oil, fuel, chemical, and hazardous waste disposal activities on the base have created groundwater pollution plumes, some of which are located within this watershed. The Air Force Center For Environmental Excellence (AFCEE) is investigating and addressing this groundwater pollution. Ashumet Pond, located in the northern portion of this subwatershed, has had high levels of phosphorus resulting from a chemical spill plume from the base. An alum treatment of the pond in September 2001 resulted in significant reductions in the amount of phosphorus available to support algal blooms. This water quality improvement should last for many years. No fish were killed as a side effect of this treatment.

There are no municipal wastewater treatment systems in this subwatershed, although the towns of Falmouth and Mashpee do have municipal water supplies. Mashpee's system is growing rapidly, adding 400 to 500 new service connections each year. Most of the new growth in town is in existing neighborhoods. With the addition of the town's fifth well in May of 2002, the district's daily capacity is 3.8 million gallons. Average daily demand among the 7,343 customers is 1.26 million gallons, though peak day demand in July 2001 was 2.7 million gallons. According to the Mashpee Water District's 2001 annual report, the district still needs at least one more well, and work is currently underway to determine a site.

Stewards:

- Citizens for the Protection of Waquoit Bay
- Waquoit Bay National Estuarine Research Reserve (www.waquoitbayreserve.org)
- WBNERR volunteers
- Waquoit Bay Watchers
- Waquoit Association
- Falmouth Associations Concerned with Estuaries and Saltponds (FACES)
- Ashumet Pond Nutrients Advisory Group
- Mashpee National Wildlife Refuge Management Committee
- Mashpee Environmental Coalition

Studies conducted in the watershed:

- Numerous studies have been conducted of Waquoit Bay. Most have been directed at the impacts of nutrient loading in coastal waters. Other studies have focused on loss of eelgrass beds;

protection of drinking water; ecological impacts of boats, docks and piers; pathogens in the estuarine water; erosion of coastlines and barrier beaches; protection of endangered species; and uplands issues.

- Monitoring – piping plover, endangered plants, water quality, fish, land use.
- Seacoast Shores Awareness Project, June 2001.
- Study of nitrogen entering the Quashnet and Child's Rivers and Ashumet Pond, conducted through the Boston University Marine Program in 2001.
- The History of the Quashnet River Valley, April 1998.
- DMF completed a Sanitary Survey along the Eel Pond shoreline in January 1994 and along the shorelines of the Great and Little Rivers Complex in May 1999.
- Studies of the impacts on wetland health of two roads on South Cape Beach.
- Mashpee Property Tract 10 was evaluated for its suitability for future water supply sites in the Phase II Priority Land Acquisition Assessment Project conducted by the Cape Cod Commission. March 2001.
- Watershed Nitrogen Management Plan and Effluent Pipeline Preliminary Design. Town of Mashpee, Massachusetts. Environmental Notification Form. September 27, 2001. (A comprehensive nitrogen and wastewater management planning project for the Town of Mashpee, the Popponesset Bay Watershed, and Mashpee's portions of the Waquoit Bay Watersheds.) Prepared by Stearns & Wheler. Funded with State Revolving Funds.
- Cape Cod Atlas of Tidally Restricted Salt Marshes. 2001. Cape Cod Commission.
- Simulated Pond-Aquifer Interactions under Natural and Stressed Conditions near Snake Pond, Cape Cod, Massachusetts. 2002. United States Geological Survey.
- The Quashnet River/Hamblin Pond/Jehu Pond system was selected as a priority area for the Estuaries Project – Southeastern Massachusetts Embayment Restoration, funded by the state and UMass Dartmouth. The goal of the project is to develop critical nutrient loading thresholds for each embayment to aid in water resources planning. The thresholds will support federal requirements for the development of Total Maximum Daily Loads for impaired surface waters. This area will be evaluated in 2002.

Who is collecting water quality data and where:

- WBNERR staff deploy data loggers that record water temperature, conductivity, pressure, pH, dissolved oxygen, and turbidity at 30-minute intervals. There are two data loggers currently in service, one in the middle of the bay and the other at the Menahaut Yacht Club. Two additional loggers will be added in the future.
- WBNERR Bay Watchers collect dissolved oxygen, chlorophyll a, and observational data from Waquoit Bay; Menahaut Inlet; Childs and Moonakiss Rivers; and Hamblin, Jehu, and Eel Pond.
- Town of Sandwich sampled surface waters of Snake Pond in summer 2000.
- The United States Geological Survey maintains a stream flow gauge in the Quashnet River, collecting data that will be used in the Massachusetts Estuaries Project.

Management actions taken:

- The Waquoit Bay was designated a No Discharge Area in 1994. Discharge of either treated or untreated wastes from boats is prohibited.
- Trout Unlimited and Massachusetts Fish and Wildlife's Sea Run Trout Restoration on the Quashnet River, conducted over the past 18 years.

- Work on an existing fishway from the Quashnet River to John's Pond is being planned. A 35-foot ladder will be replaced in a project partially funded by the Wildlife Habitat Incentives Program of the Natural Resource Conservation Service. 2001.
- Mashpee Conservation Commission received a 2002 Self-Help Grant of \$250,000 to purchase the Prime View Property for open space. The 8.5 acre property on Abigails Brook tidal creek is a critical link between federal Fish and Wildlife Lands.
- Development of the Waquoit Bay NERR Management Plan. The Reserve has undertaken many actions on its own land such as controlled burn on Washburn, extensive education and training programs, endangered species management, stewardship projects, trails, land acquisition, and conservation easements.
- The Air Force Center for Environmental Excellence (AFCEE) is conducting clean up activities in the northern portion of the subwatershed to address the groundwater plumes emanating from the Massachusetts Military Reservation. These include the completion of a groundwater treatment system for the SD-5 South plume and a part of the CS-10 plume in January 2000, an alum treatment in Ashumet Pond to reduce phosphorus in the sediment in September 2001, and installation of wells to monitor of the leading edge of the CS-10 groundwater plume.
- The Town of Sandwich limited boat engines to 15 horsepower on Snake Pond.
- Massachusetts Division of Fisheries and Wildlife stocks Johns Pond with rainbow, brook, and brown trout. The Childs River is annually stocked with sea run brown trout.

Subwatershed facts: (For data sources see Appendix)

- 21 E sites: 20 Massachusetts Military Reservation sites
- Solid waste sites: none
- Zone IIs located in this watershed: 3
- Interim Wellhead Protection Areas (IWPAs): 3
- Percent of the undeveloped land that is protected (according to 1985/1990 data): 37.2%
- Acres of existing wetlands: 485
- Certified vernal pools: 5
- Named freshwater ponds: Fresh, Bog, Bournes, Calebs, Grassy (*Falmouth*), Martha, Cataquin, Johns, Flashy (Deborah Bottles), Ashumet, Moody, Fells, Witch, Jehu (*Mashpee*), Weeks, Snake (*Sandwich*)
- Named rivers or creeks: Childs, Seapit, Moonakiss, Great, Little (*Falmouth*), Quashnet, Abigail's Brook, Dutchman's Creek (*Mashpee*), Red Brook (*Falmouth, Mashpee*)
- Outstanding Resource Waters: Waquoit Bay, Hamblin Pond, Red Brook (*Falmouth, Mashpee*), Eel Pond, Childs River, Quashnet River, Moonakiss River, Bog Pond, Bourne Pond, Caleb Pond (*Falmouth*), and Jehu, Fells, Sedge Lot, and Witch Ponds (*Mashpee*)
- 1998 Massachusetts 303(d) List of Impaired Waterbodies: Moonakiss River and Waquoit Bay – nutrients and organic enrichment/low dissolved oxygen, Waquoit Bay – pathogens.
- Shellfish growing areas: Most parts of the bay are approved. The uppermost reach on Eel Pond is conditionally approved. Sedge Lot Pond and the inner reaches of Hamblin Pond are prohibited.
- Beach closures: South Cape Beach was closed to swimming for at least one day during the 2001 season due to high enterococcus bacteria counts.
- This watershed contains Natural Heritage and Endangered Species Program (NHESP) Estimated Habitats of Rare Wildlife.

Priorities:

- Hamblin and Jehu Ponds and the Quashnet River are priority areas for developing critical nutrient loading thresholds to aid in water resources planning and the development of TMDLs.
- Maintain trout run on the Quashnet River.
- Evaluate impacts of dam removal on the Quashnet River on area wildlife.
- Obtain funding to incorporate the hydrology of the man-made canal connecting wetlands with Great Flat Pond into a study that found that two roads on South Cape Beach interfere with flow, resulting in wetlands degradation.
- Obtain funding to implement the South Cape Beach wetland restoration plan currently being developed.
- Conduct a biodiversity inventory of the upland areas of the WBNERR.
- Wastewater treatment (denitrifying) for heavily congested areas such as Sea Coast Shores, Seconset, and Monomoscoy.
- Ashumet, Johns, Moody, and Bourne Ponds need volunteers to participate in the Pond and Lakes Stewardship Project (PALS), measuring water quality and other characteristics of the ponds.
- Town of Falmouth should refer to DMF sanitary surveys to identify priority sites for stormwater remediation.
- Protect 1,200 acres of undeveloped land within the MNWR acquisition boundary, according to the Management Committee's priority list of acquisitions.
- Preserve open space priority acquisitions outlined in Mashpee's Conservation and Recreation Plan.
- Acquire open space. Parcels considered a priority for acquisition for water supply protection and development: Falmouth Tracts 4, 6, 11, 12, 19, 26, 33, and 35 were ranked as having medium or high water supply development potential in the Cape Cod Commission's *Priority Land Acquisition Assessment Project* (April 1999). These tracts are located throughout the Town of Falmouth.
- Implement those salt marsh restoration projects identified in the 2001 *Cape Cod Atlas of Tidally Restricted Salt Marshes* that have been evaluated and prioritized by the town. Sites are: Meadow Neck Road restriction of Moonakiss River (Site FA-8), Monomoscoy Road restriction of Dutchman's Creek (MA-1), Monomoscoy Road restriction of channel between Hamblin Pond and the Great River (MA-2), Great Hay Road restriction of Abigail's Brook (MA-3), Great Oak Road restriction of channel from Sage Lot Pond to Flat Pond (MA-4), and Great Oak Road restriction of channel from Sage Lot Pond to Flat Pond (MA-5).

Recreation:

Camping areas:

- Washburn Island, 11 sites
- Camp Good News

Golf courses:

- Quashnet Valley Country Club

Pathways and trails:

- 3.5 miles on WBNERR property
- www.capecodcommission.org/pathways/trailguide.htm

Public access:

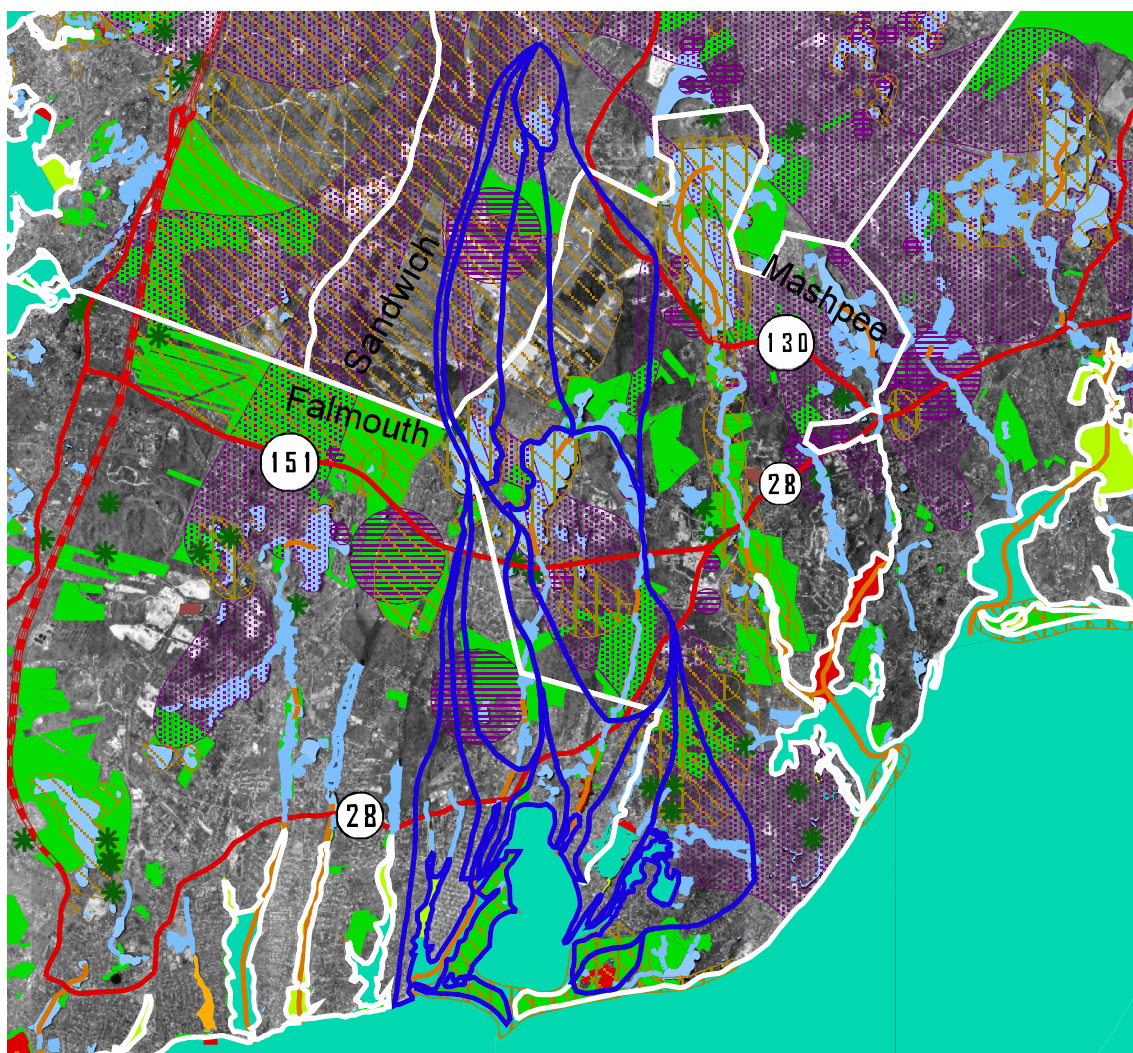
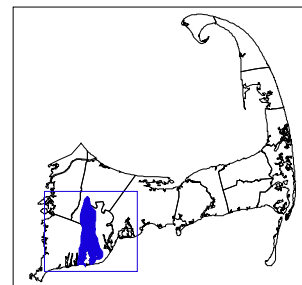
- www.state.ma.us/dfwele/pab/pabSEmap.htm

Public beaches and landings:

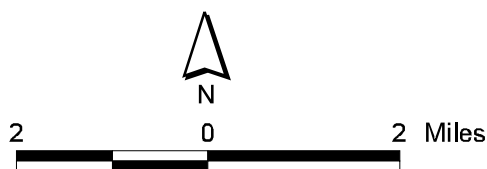
- South Cape Beach, Mashpee Town Beach at South Cape Beach (Mashpee residents only), Washburn Island, Snake Pond Beach, Town Beach on John's Pond
- White's Landing, Great River Town Landing, Johns Pond State Landing

Waquoit Bay

Mashpee, Falmouth, and Sandwich, MA



Watershed Resources



Natural Heritage and Endangered Species Program Data

- Certified Vernal Pool
- Priority Habitats of Rare Species
- Estimated Habitats of Rare Species

Groundwater Protection Areas

- Interim Wellhead Protection Area
- Zone II
- Solid Waste Facility

Watershed Boundary

Anadromous Fish Run

Shellfish Growing Areas

- APPROVED
- CONDITIONALLY APPROVED
- MANAGEMENT CLOSURE
- PROHIBITED
- RESTRICTED
- Open Space

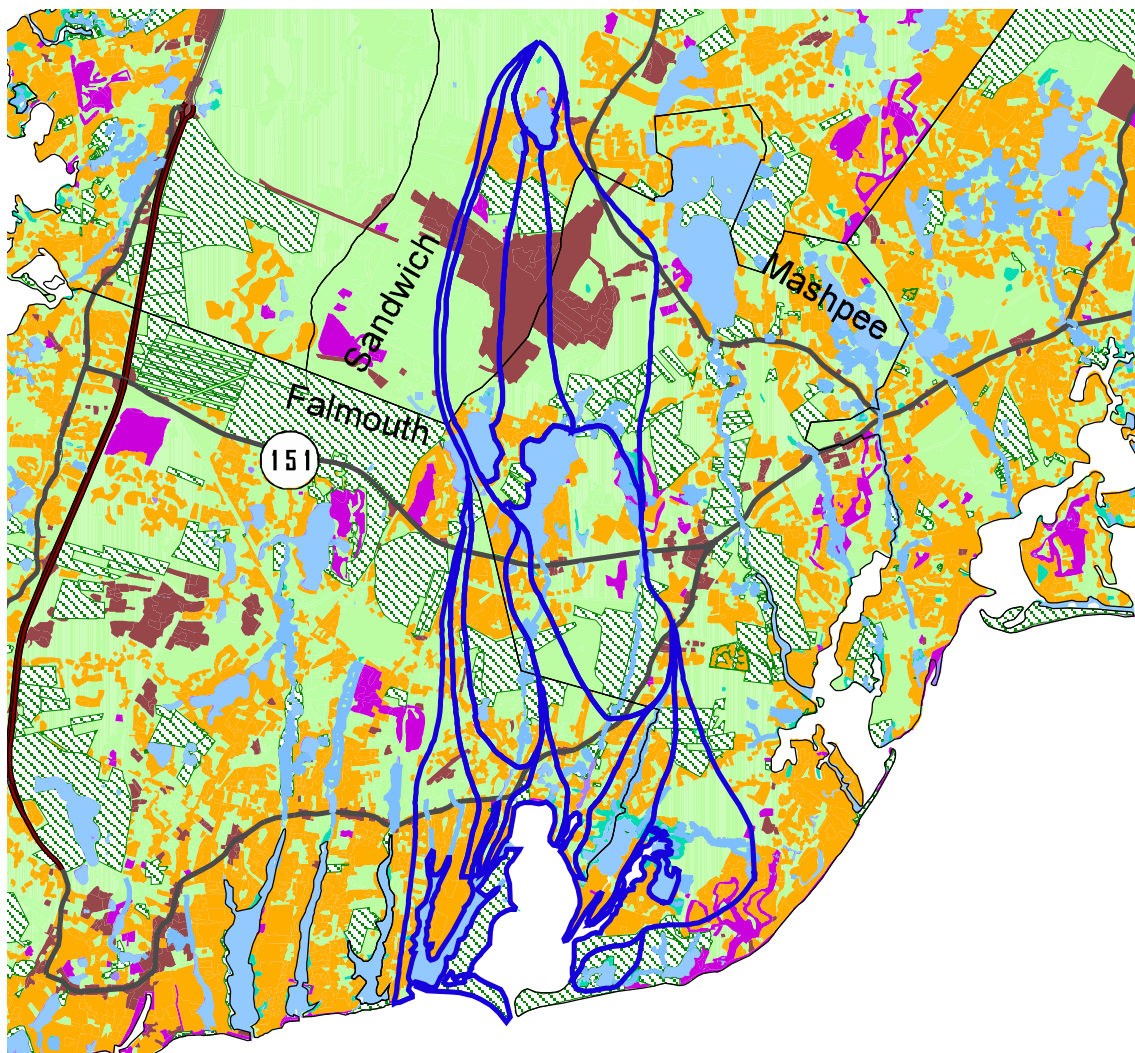
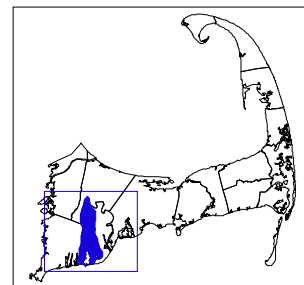
Streams

Ponds

Roads

Waquoit Bay

Mashpee, Falmouth, and Sandwich, MA



Land Use

Land Use

- non-residential developed
- open land
- recreation
- residential
- water
- wetland

- Streams
- Ponds
- Watershed Boundary
- Protected Open Space

